Assimilation of wind profiles from multiple Doppler Radar Wind Profilers for space launch vehicle applications.

Atmospheric wind data are required by space launch vehicles in order to assess flight vehicle loads and performance on day-of-launch. Space launch ranges at NASA's Kennedy Space Center co-located with the United States Air Force's (USAF) Eastern Range (ER) at Cape Canaveral Air Force Station and USAF's Western Range (WR) at Vandenberg Air Force Base have extensive networks of in-situ and remote sensing instrumentation to measure atmospheric winds. Each instrument's technique to measure winds has advantages and disadvantages in regards to use within vehicle trajectory analyses. Balloons measure wind at all altitudes necessary for vehicle assessments, but two primary disadvantages exist when applying balloon output. First, balloons require approximately one hour to reach required altitudes. Second, balloons are steered by atmospheric winds down range of the launch site that could significantly differ from those winds along the vehicle ascent trajectory. These issues are mitigated by use of vertically pointing Doppler Radar Wind Profilers (DRWPs). However, multiple DRWP instruments are required to provide wind data over altitude ranges necessary for vehicle trajectory assessments. The various DRWP systems have different operating configurations resulting in different temporal and spatial sampling intervals. Therefore, software was developed to combine data from both DRWP-generated profiles into a single profile for use in vehicle trajectory analyses. This paper will present details of the splicing software algorithms and will provide sample output.